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IN THE UNITED STATES DISTRICT COURT

FOR THE EASTERN DISTRICT OF CALIFORNIA

THE CALIFORNIA NATURAL RESOURCES AGENCY, ET AL. **PLAINTIFFS,** **V.** **GINA RAIMONDO, ET AL.,** **DEFENDANTS.**	**CASE NO. 1:20-CV-00426-DAD-EPG** **SUPPLEMENTAL DECLARATION OF LES GROBER IN SUPPORT OF MOTION FOR INTERIM INJUNCTIVE RELIEF AND TEMPORARY STAY OF LITIGATION** Date: February 1, 2022 Time: 9:30 a.m. Dept: 5 Judge: The Honorable Dale A. Drozd Trial Date: TBD Action Filed: February 20, 2020

I, Les Grober, declare as follows:

1. I have nearly 30 years' experience as a hydrologist. Since 2006, I have worked for the State Water Resources Control Board (State Water Board), which oversees water rights throughout the State of California, including the water rights in the Delta, Sacramento River and San Joaquin River water rights. Before my retirement in 2017, I served as the Deputy Director for Water Rights, as manager of the State Water Board's Hearings and Special Programs Section and as Division of Water Rights Assistant Deputy Director, overseeing the Hearings and Special Programs Branch. I retired from the State Water Board in 2017, and I have been employed as a retired annuitant for the State Water Board's Division of Water Rights from June 2018 through the present.

2. I reviewed the following material for preparation of this Declaration:

- Declaration of Mr. Bergfeld, Document 238 Filed 01/10/22
- Declaration of Mr. Deas, Document 239 Filed 01/10/22
- Defendant-Intervenors' Response to State Plaintiffs' Motion for Interim Injunctive Relief and Temporary Stay, Document 233 Filed 01/10/22
- Various Public State Water Resources Control Board (State Water Board) documents pertaining to 2015 Shasta Reservoir and Sacramento River Temperature Management

INTERVENORS' MISCHARACTERIZATION OF THE INTERIM OPERATIONS PLAN (IOP)

3. Intervenors conflate complexity with correctness. Expert modelers routinely use simplifying assumptions to inform decision-making. Not making such simplifying assumptions frequently has the effect of obfuscating central facts, as is the case with the declarations filed by both Mr. Deas and Mr. Bergfeld on Defendant-Intervenors' behalf.

4. The Defendant-Intervenors' 1/10/22 filing, document 233, lists the following four items that they allege are important to the matter at hand:

1. Water temperature data;
2. The contracts obligations of the United States Bureau of Reclamation (Reclamation);

3. The probability that hydrologic conditions would permit Reclamation to achieve the temperature targets in the Interim Operating Plan (IOP); and

4. Whether Reclamation's water rights would permit it to operate pursuant to the IOP.

5. Regarding item 1, one of the central features of the IOP is that deliveries from Shasta may not occur, except for health and safety purposes, before a temperature management plan is developed. In paragraph 48 of my November 23, 2021 declaration (ECF 223)[1], I state, quoting from the IOP:

> Under the IOP, in critically dry or dry years USBR may not make deliveries other than for health and safety, "until Reclamation receives approval of a temperature management plan from NMFS that shows Reclamation will meet winter run Chinook salmon habitat criteria and end of September carryover storage . . . ." (IOP provision 12.i.9.). "Reclamation will not schedule nor make deliveries of stored water from Shasta for any reason other than specified in g.i.1.a. above until Reclamation receives approval of a temperature management plan from NMFS that shows Reclamation will meet winter run Chinook salmon habitat criteria and end of September carryover storage…"[2]
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> Grober Decl., ¶ 48 (quoting ECF 221, ¶ 12.i.9)

6. Temperature and other modeling are necessary elements of any temperature management plan. That is a foundational basis for the plan—demonstrating how specific temperature goals can be achieved based on Shasta Reservoir conditions, including volumes and associated temperature of stored water. Such temperature data and associated modeling is not, however, needed to make an informed decision on the merits of the process identified in the IOP. My analysis, as I explain below, demonstrates that the IOP prescribes a process under which planning (and associated modeling) are far more likely to produce better outcomes than under the process outlined in the National Marine Fisheries Service 2019 Biological Opinion (BiOp) because, as documented in my November 23, 2021, declaration, measures in the IOP are far preferable to those in the BiOp to protect winter run Chinook salmon and other species.

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[1] For the convenience of the Court, I will quote my November 23, 2021, declaration (ECF 223) as "Grober Decl."

[2] Much ado was made in the Deas and Bergfeld Declarations regarding the use of "critically dry year" versus "critical year." This is a good example of how both declarations focus on irrelevant details. Both terms are frequently used in hydrology, and there is no confusion as to their meaning.

7. Item 3 on Defendant-Intervenors' list, "the probability that hydrologic conditions would permit Reclamation to achieve the IOP's temperature targets," is precisely the point of the IOP, which is central to my analyses, conclusions, and opinions in my November 23, 2021, declaration. The IOP states: "If Reclamation is unable to meet habitat criteria for the entire period the agencies will agree on an operation to provide sufficient habitat for the longest period possible." ECF 221, ¶ 12.i.b. I cite several examples of how constraints and flexibilities afforded in the IOP work together to provide a far better plan to effectively manage temperatures than does the BiOp, including from paragraph 62:

> Lower temperatures lead to overall better survival of salmon, which is also why both the 2019 BiOp and the IOP identify different temperatures for different year types and hydrologic conditions. This is done because these temperatures are based, in part, on the ability to attain them, just as does 90-5. Temperatures that are too low in dry years would simply make attainment difficult or impossible, and so are not very useful as an operational target. The 2019 BiOp simply sets the temperature target at higher and less protective levels.
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> Grober Decl., ¶ 62.

8. Per the IOP, this same logic will be followed to determine the full range of possible temperature management operations before water is prematurely delivered from Shasta to North of Delta (NOD) contractors, which is allowed under the BiOp. As I conclude in paragraph 63:

> The failure of the 2019 BiOp to reduce or eliminate NOD diversions before a successful temperature management plan is developed, and the lack of end of September (EOS) Shasta storage requirements, have the effect of skewing all years towards temperature management in the higher tiers of the 2019 BiOp, and their associated higher temperatures. This is because the failure to plan early under the 2019 BiOp preordains reservoir conditions to be unfavorable for successful temperature management, and harmful to winter run Chinook salmon.
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> Grober Decl., ¶ 63.

9. My November 23, 2021, declaration is crafted around understanding and describing the realm of all possible Shasta Reservoir operational scenarios, which is greatly expanded by operating under the provisions of the IOP (in contrast to the BiOp). The IOP, as I state in my declaration in paragraph 73, has a mechanism to adjust to conditions when they are better known:

> In my opinion, IOP measures have a process under which decisions and early deliveries can be made from Shasta so long as it can be shown that these releases will not be harmful to fish. IOP provision 13 states: "Reclamation may make releases… for deliveries as early as April 1, 2022 provided that they are consistent with the terms of this IOP for Water Year 2022." This provision also describes a process

> where USBR will confirm with the Shasta Planning Group on a weekly basis starting February 1, 2022, that the multiple priorities in the IOP can be satisfied and that reservoir releases will be adjusted accordingly. This requirement, for USBR to confirm its ability to meet the priorities in the IOP on a weekly basis, is a critically important element of the IOP considering how quickly and significantly hydrology can change.
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> Grober Decl., ¶ 73.

10. The other two items, item 2 and 4, "Reclamation's contract obligations", and "whether Reclamation's water rights would permit it to operate pursuant to the IOP" are, in my view, irrelevant to the principal question posed to me—which is better for winter run Chinook salmon, the IOP or BiOp? Though I was not asked to weigh in on issues of institutional feasibility suggested by these topics, my opinion, to the extent that it is relevant, is that there are institutional remedies that could be used to harmonize any actual or perceived conflicts between water rights or contract obligations and measures in the IOP. Neither of these issues, however, are deficiencies because they do not detract from the merit of the range of possible physical solutions afforded by the IOP. These related issues must simply be addressed by decision-makers in conjunction with the available technical solutions.

IMPORTANCE OF STORAGE

11. Although it is not the case in all things, the overarching effect of Shasta Reservoir storage on the ability to manage temperatures through the temperature control season, with everything else being equal, is that more storage is better, both in March, April, and May, before commitments to deliver water are made, and again in September, as carryover storage for the next year.

12. Analogies can be problematic; however, viewing Shasta storage as a cash bank account is not far off the mark. Unlike a bank of money, the water stored in Shasta can have different values (colder is better), but just like a bank of money, everything else being equal, more is better. There certainly there are complications of how much interest is earned, how much additional money you will be able to deposit, what you will need to buy in the upcoming year, and how much things will cost when you must buy them, among other things. But all these things are the same whether or not you have more or less money initially in the bank. You may not

know what you will need to buy and how much it will cost until later in the year, so, though it may seem wise to buy a certain car early in the year, this may turn out to have been a bad decision if you are no longer able to pay for food and rent later in the year. The time to determine how expensive a car you can buy is best delayed until you have a good idea of how much money you will need for food and rent to inform how much is left in the bank, and what car you can afford to buy. This is precisely what the IOP does.

13. The only part of this logic, of more is better, that fails is for the instance where there is a large volume of warm water that not only would serve no useful function for providing cold water, it could also, in fact, cause a problem later in the temperature control season if some portion of it was released and blended with cold water, making the release water too warm for winter run Chinook salmon downstream. In this instance it would be important to release this water early before it could cause such harm. This water could be used, without reservation, to meet NOD contractor or other needs. The Shasta Planning Group, operating under the terms of the IOP would simply determine that it would be prudent to release this water in March, April, and May. The IOP allows releases of Shasta storage to NOD contractors so long as it does no harm to temperature management and winter run Chinook salmon. The modeling and analyses performed by the Shasta Planning Group, working together with USBR, would inform how to operate Shasta in any manner necessary to avert any other such problem that could arise. In contrast to the BiOp, the IOP allows early and adaptive responses to a wide range of conditions. The same cannot be said for operating under the BiOp, which precludes certain beneficial temperature management operations.

USE OF MODELS

14. The observations made by Mr. Deas and Mr. Bergfeld are in many cases correct, especially regarding the need to use temperature and other models, but they misunderstand how and when such model analyses can and must be used to inform successful Shasta Reservoir operation. Nonetheless, I highlight some inaccuracies of their opinions below. Both Mr. Deas and Mr. Bergfeld miss the point of my principal opinion, or perhaps they are merely attempting to discredit it because it is simple: the principal mechanism that can be employed to improve

conditions for winter run Chinook salmon is to not make premature decisions before all available options are known. Modeling, of course, must be done before any specific operational path is selected. That is precisely the point. Conducting complicated modeling of all possible future outcomes under a range of all possible future conditions before the nature of the specific hydrologic conditions is better known serves little purpose given the interim nature of the elements in the IOP.

15. The IOP must function for one year under specific and unknown hydrology. In the approximately seven or eight weeks since I completed my November 23, 2021, Declaration, I observe that December was far wetter than forecasted just weeks earlier, and January is unfolding as very dry. Aside from long-range forecasts, which have high levels of uncertainty, it is too early to know what Shasta Reservoir conditions will be in March, April, and May. Just a few large storms, and whether or not these storms provide rain or snow, between now and March, April, and May, will have an enormous effect on water volume and temperature conditions in Shasta. The nature of what is possible and what is not will become clearer in March, April, and May (clearer with each passing month). Under the IOP, Reclamation may not make unilateral decisions on Shasta operations without many experts, from many agencies, weighing in on what is and what is not possible, using, among other things, all the models that Mr. Deas and Mr. Bergfeld describe. The IOP, in contrast to the BiOp, simply prevents Reclamation from making regrettable decisions that would foreclose successful temperature management.

16. I understand that some modeling may have already been done to identify possible "what-if" scenarios. Doing so is fine so long as it is understood that such modeling, unless it is exhaustive in the range and number of permutations modeled, will provide an incomplete answer compared to what can be done when more information is in hand. If done correctly, such modeling can be used to explore the bounds of what is possible. Depending on the assumptions used for various factors, I have no doubt that such modeling would show precisely what I have concluded here and in my November 23, 2021, Declaration, that, all things being equal, more water left in storage in Shasta Reservoir in March, April, and May, and again in EOS, will have the overarching effect of making it more possible to successfully protect winter run Chinook

salmon than if less water is left in storage at those times, over a wide range of conditions. Modeling can be used at any time to demonstrate this, though as I have said in many ways, and many times, it is not necessary to do so to support this fact.

PROBABILISTIC HYDROLOGY

17. Mr. Bergfeld states in paragraph 54: "Mr. Grober's comparisons of hydrology and reservoir operations between 2015 and 2021 ignore important facts related to 2021 hydrology and operations. Mr. Grober implies water years 2015 and 2021 were hydrologically similar because the Sacramento Valley Index in each year was approximately the same. He makes no comparison of the inflow to Shasta in these two years despite the importance of inflow as a factor in reservoir storage." Mr. Bergfeld continues in paragraph 54: "Mr. Grober ignores the change in the forecasted hydrology that occurred between the April and May forecasts in 2021. Finally, Mr. Grober ignores the operational decisions made by Reclamation and DWR for the integrated CVP/SWP system in 2021."

18. It appears Mr. Bergfeld either did not read or did not understand paragraph 69 of my declaration, where I discuss the change in forecasted hydrology:

> The 80 percent range of forecasted flows based on forecasts made for February through May 2021 are shown in Table 5. The forecasted range of flows changes and narrows from February through May. The range will generally narrow in all years, as it does in this example, as more information about snowmelt becomes available, making it easier to know what future inflows will be. In the case of the May 1 forecast, the April component of April through July inflow is already known, allowing the range of uncertainty to narrow even more. The actual sum of April through July unimpaired flow into Shasta Reservoir in 2021 was 1,026 taf, which is very close to the unimpaired flow forecasted at the low end of the range of the February through April forecasts. The actual flow was the flow forecasted to have a 90 percent level of exceedance in February through April. This demonstrates that one cannot simply assume that inflows will fall in the middle of a forecasted range. The actual amount was near the top of the range of the May 1 forecast. This shows how the forecast changed and narrowed as the very dry hydrology in 2021 unfolded from February through May.
>
> Grober Decl. at ¶ 69.

19. It is, in part, because of the probabilistic nature of forecasts that the IOP is preferable to the BiOp. The range of possible future hydrology must be considered before any premature releases are made from Shasta Reservoir (among other operational decisions). The actual inflow to Shasta for April through July in 2021 was 705 thousand acre-feet (taf), approximately 69

percent of the actual unimpaired flow of 1,026 taf. Hydrologists understand that unimpaired flow does not translate into actual flows at any specific location, and they account for these differences (or at least, they should) in their assumptions and models. The central point in my November 23, 2021, Declaration, and repeated here, is that there was adequate information starting in early February 2021, to know that there was a ten percent chance that the dry conditions that occurred in 2021 would occur. The actual unimpaired flow that occurred had at least a ten percent chance of occurring in the probabilistic forecasts made in Bulletin 120 for February 1, March 1, and April 1. The hydrology was not a big surprise. Rather, inadequate provisions were seemingly made by Reclamation to be able to successfully operate in the event that this ten percent probability occurred, which, unfortunately, it did. With the Shasta Planning Group more directly involved in data analysis, modeling, and decision-making as prescribed under the IOP, it is far more likely that Reclamation will conduct "no regret" Shasta operations, which will not occur under the BiOp.

20. A simple explanation does not make it less correct. In fact, adding unnecessary complexity to what is at its essence a relatively simple problem, has the effect of muddling understanding. More water maintained in storage later in the year provides a higher likelihood of having more cold water later in the year. The opposite cannot be said. Having less water cannot translate into having more cold water. It is, of course, possible to have a volume of warm water in Shasta that one would want to "get rid of" because it could, in fact, cause adverse temperature problems if released later (and blended with colder water). The IOP allows this early release. If this is the forecasted situation, when volumes and temperatures of water in Shasta are known with sufficient certainty to inform this decision, then the volume of water that is too warm would be released from storage. However, if this is not the case, and modeling in the moment shows that the water is better saved in storage to perform desirable temperature functions later in the season, then that is what can happen under the IOP. In contrast, under the BiOp, Reclamation may unilaterally, and inadvisedly, decide to release water from Shasta Reservoir before the volumes and temperature of water are known with sufficient certainty.

21. Mr. Bergfeld also mischaracterizes the analysis of Sacramento River hydrology prior to 2015 and 2021 that I made in my November 23, 2021 Declaration, though he does also provide a useful data point that I did not have access to at the time. In paragraph 54, Mr. Bergfeld states: "A more significant factor is that while the Sacramento Valley Index for 2015 and 2021 were similar, the hydrology in those individual years was different, particularly the inflow to Shasta". Although I do also mention water year indices, I focused my analysis on examples of the actual unimpaired flow (not the index). In paragraph 56 and associated figure 1, Mr. Bergfeld compares unimpaired Sacramento River Watershed unimpaired flow for 2015 and 2021-- 9.23 million acre-feet (maf) in 2015 versus 6.25 maf in 2021. Mr. Bergfeld correctly states that 2021 is the lowest on record, but that is not the most pertinent point, as is explained below.

22. Mr. Bergfeld also states: "The inflow to a reservoir is a key factor in the resulting storage in that reservoir." In paragraphs 62 through 66, Mr. Bergfeld also correctly notes how reservoir operations are affected by overall system demands of the CVP and SWP. Therefore, as Mr. Bergfeld appears to agree, Sacramento River Watershed unimpaired flow is an excellent measure of water supply for the combined SWP and CVP. As large reservoirs are generally operated to provide a more stable water supply over several years to account for annual variability, the overall water supply to CVP and SWP reservoirs over a two- or three-year period is a far more useful measure than a snapshot of just one year. Expanding the data that I presented in table 1 of my 11/23/21 declaration with the additional unimpaired flow of 6.21 provided by Mr. Bergfeld, shows that the two-year unimpaired flow in 2020 and 2021 was 15.96 maf (9.71 + 6.25). This is only four percent lower than the two-year sum of 2014 and 2015, which was 16.69 maf (7.46 + 9.23). The three-year unimpaired flow for 2019 through 2021 was 40.67 maf (24.77 + 9.71 + 6.25), which is 11.79 maf ***higher*** **(41 percent higher)** than 2013 through 2015, which had a total three-year unimpaired flow of 28.88 (12.19 + 7.46 + 9.23). With this additional data point, Mr. Bergfeld has confirmed how much wetter the overall conditions were leading up to and through 2021 than were the three years leading up to and through 2015. And yet, EOS storage in 2021 was 1.07 maf, after operating for two years under the 2019 BiOp, compared to 1.60 maf in 2015. Approximately 500 thousand acre-feet less water remained in Shasta in September 2022

than in 2015 even though the overall water supply, as measured by unimpaired flow, was nearly 12 million acre-feet (41 percent) higher in the three years leading up to, and including, 2021.

23. Mr. Bergfeld appears to be unfamiliar with the probabilistic nature of unimpaired flow forecasts. In Paragraph 61 of his declaration, Mr. Bergfeld refers to "the unexpected change in hydrologic forecasts in 2021." In table 5 of my November 23, 2021, Declaration, I specifically show the probabilistic range of flows in April and May (and also February through March). The important point, that appears to have eluded Mr. Bergfeld, is that as more information becomes available, the bands of the forecast narrow. Interestingly, however, the final May forecast and the actual final hydrology had at least a ten percent chance of occurring based on the information available in January. The extremely dry conditions in 2021 were largely knowable, but unfortunately this useful probabilistic information seems to have been largely ignored by Reclamation.

THE IOP DECISION-MAKING PROCESS IS PREFERABLE TO THE BIOP

24. Mr. Bergfeld, in paragraph 69, misses the central point of my paragraph 77, where I suggest methods that could reduce the deleterious effects of water deliveries to NOD contractors that are either reduced or shifted in time, and also disclose the limits on the availability to do so. The central point of my opinion in my November 23, 2021, Declaration, however, pertains directly to the matter of the benefit of the IOP in contrast to the BiOp:

> Fish and wildlife cannot rely on groundwater, and water shifted in time does not offset harm done to fish and wildlife if the water or water quality is not available at the right time.
>
> Grober Decl. at ¶ 77.

25. The IOP provides the mechanism to better assure (than the BiOp) that appropriate water and water quality is provided to winter run Chinook salmon and other fish and wildlife at the right time. And contrary to what Mr. Bergfeld states in his declaration, the physical and regulatory constraints on the volumes of water transfers and groundwater pumping have no bearing on the ability to improve conditions for winter run Chinook salmon under the provisions of the IOP. The effects, even if not in any way mitigated, may simply and unfortunately be, the cost, to water users, of protecting winter run Chinook salmon.

26. The problem of sufficient certainty is problematic. All future conditions cannot be known with certainty, however, it is possible to determine the quantity and temperature of water in Shasta Reservoir during the critical March through May period (and beyond). Reclamation uses so-called isothermobaths[3] to graphically depict the relative quantities of different temperature water in Shasta as they change over time. Even if this part of the equation is fully known, one must make assumptions about future air temperatures during the times when the mixed water is released. If one underestimates the air temperature, then it will not be possible to achieve the water temperatures modeled downstream. Conversely, if one overestimates the future air temperatures (cooler summer than modeled), then there could be more water available than needed to meet temperature goals. The problem is operating too close to the edge. The IOP requires collaborative assessment by the Shasta Planning Group, including modeling, to better understand what is possible **before** a premature decision to release water is made that precludes possible, and more favorable, outcomes for winter-run Chinook salmon.

27. In paragraph 38 and associated table 3, Mr. Bergfeld presents a misleading and overly simplistic set of facts and dates. Per his table 3, the TMP was submitted to the State Water Board on April 14, 2015, and approved on June 25, 2015. Based, in part, on this, Mr. Bergfeld opines in paragraph 73: "In my opinion, Reclamation's experience and expertise in operating the CVP make it better suited to retaining final authority over operational decisions."

28. Mr. Bergfeld neglects to list or describe several intervening, important steps that occurred in 2015. Contrary to Mr. Bergfeld's assertion, Reclamation's actions in 2015 show that it did not share or rely upon the most recent, and important, information to inform decision-making. Reclamation's lack of information sharing and unilateral, premature decision-making in 2015 precluded successful Shasta Reservoir operations.

29. A May 14 letter from Thomas Howard, Executive Director of the State Water Board, to Ron Milligan, CVP Operations Manager for USBR, which provisionally approved the TMP,

[3] *Iso* meaning same, *thermo* meaning temperature, and *bath* meaning bathymetric depth. An isothermobath is therefore a graphical depiction of temperature profiles at specific depths in a reservoir (layers of different temperature water) as they change over time.

describes several steps and meetings that occurred prior to Mr. Milligan submitting a revised plan on May 4. A State Water Board staff PowerPoint presented during a June 24, 2015, State Water Board workshop on the drought, provided the following detailed chronology of TMP submittals and approvals:

- May 14: Executive Director provisionally approved TMP, directed U.S. Bureau of Reclamation (Reclamation) to meet 56° at Clear Creek and to provide immediate notification if temperature compliance could not be achieved;
- May 20 workshop: Reclamation stated that temperatures could be maintained throughout season;
- May 29: Reclamation provided notice that temperatures could not be met;
- May 29: Executive Director suspended the TMP;
- May 29 – June 16: Reclamation developed new TMP in consultation with Department of Water Resources, fisheries agencies, and State Water Board;
    - Consistent with agreed-upon elements of revised plan, June 16 letter from Executive Director: – Provisional approval of April/May TMP remains suspended;
    - Optimize temperatures using real-time decision making;
    - Maintain Keswick releases of 7,250 cfs;
    - Target 57° F at Clear Creek, not to exceed 58°;
    - Conduct all necessary monitoring and reporting requested.

30. Also at this June 24th workshop (see part 4, available at SWB website, SWRCB Public Workshop - June 24, 2015 (ca.gov), timestamp 18:00 to 24:00), Mr. Milligan acknowledged that the most recent temperature data, available on April 28 and May 13, was not used to inform the TMP that Reclamation submitted to the State Water Board for approval on April 14 and 15 and updated on May 4.

31. In my opinion, this demonstrates that Reclamation does not always make the most recent, and important information available to a wide range of experts, and that this has the effect of precluding Shasta Reservoir operations that could protect winter run Chinook salmon. The

IOP assures not only that information is timely shared, but also that Reclamation can benefit from the expertise of scientists, engineers, and others to make timely and fully informed decisions.

32. My opinion differs markedly from Mr. Bergfeld's. In my opinion, the undesirable features of 2015 operations stemmed largely from Reclamation not sharing the latest information with other agencies. Other agencies were therefore unable to make fully informed decisions in a timely manner. Had this information been timely shared with other agencies, at the end of April, for example, there was potential to make better operational decisions that would have been more protective of winter run Chinook salmon. In my opinion, 2015 is a case study of how more and better information must be shared with a wider range of experts, particularly in years such as 2015. The central lesson from 2015 is that operational decisions, particularly with regard to delivery of water to NOD contractors in March, April, and May, must be deferred until hydrology, Shasta temperature, and all other pertinent information are shared with the entities involved with IOP decision-making, and these entities have time to analyze this information. The IOP starts this information-sharing and meeting on a biweekly or frequent basis starting in January, and starting in February, Reclamation must "confirm with the Shasta Planning Group on a weekly basis that the multiple priorities identified in this agreement can be satisfied…" Unlike the BiOp, the IOP has a process that can succeed even in light of otherwise unfavorable water supply and temperature conditions.

33. Mr. Bergfeld conflates operational complexity misconstrues In paragraph 67, Mr. Bergfeld states: "In paragraphs 44 and 45, Mr. Grober suggests the volume of water released from storage in Shasta prior to May 31st in 2015 and 2021 could have been retained in storage to provide more cold water for temperature management after May 31st with the use of the TCD. There are several issues with Mr. Grober's opinion on this topic. First, Mr. Grober offers only his opinion and does not state the basis of it or provide information regarding the operation of the CVP/SWP system sufficient to understand the purpose of the water released from storage during the time-periods he identifies. This is important because the water was released to meet a purpose within the CVP/SWP system and retaining the water would, at a minimum effect (sic, assumes means affect) another beneficial use of water, and potentially violate a non-discretionary

requirement in the operation of the CVP/SWP system. Second, Mr. Grober equates a volume of water released during this period to an equivalent volume of cold water retained in Shasta that could be accessed later with the TCD. This opinion oversimplifies the physical system and Reclamation's use of the TCD throughout the entire temperature management season, including during the period when Mr. Grober suggests water should be retained in storage. The water Mr. Grober suggests should be retained in storage was not necessarily from the Shasta cold water pool. During these periods Reclamation was utilizing the TCD and other outlets to release warmer water, not colder water, while managing to downstream temperatures objectives."

34. It is unnecessary to understand all the potential purposes of the water being released from Shasta to form an opinion on the potential harm of having done so on winter run Chinook salmon. And contrary to what Mr. Bergfeld asserts, any release of water from Shasta is potentially also a release of cold water. All things being equal, more water in Shasta provides the potential for more cold water. It is illogical and incorrect to infer, as does Mr. Bergfeld, that saving more water in Shasta in March, April, and May, under the IOP could have a harmful effect on winter-run Chinook salmon. Maintaining higher storage in March, April, and May will, in general, be preferable to not doing so. In paragraph 56 of my declaration, I stated:

> Each year, however, will have different temperature profiles and there will be different potential benefits associated with using stored water for temperature control. In some instances, there could be a quantity of very warm water on or near the surface of Shasta Reservoir that can be used for water supply in March, April, and May without having any large effect on temperature control in the following months.
>
> Grober Decl., ¶56

35. In my opinion, the six-agency Shasta Planning Group and associated processes under the IOP can be used to adjust releases from Shasta Reservoir in response to any specific Shasta Reservoir temperature conditions.

FEASIBLE OPERATIONS

36. Mr. Bergfeld makes numerous references to feasibility of operations and operational constraints. In paragraph 17, Mr. Bergfeld states: "The lack of modeling and analysis of CVP/SWP operations under the 2022 IOP means there is… no basis or proof that the 2022 IOP is **feasible** under a reasonable range of potential hydrology. I define **feasible** as an operation of the

CVP/SWP system that meets the requirements of the 2022 IOP and other non-discretionary requirements of the CVP/SWP system including the SRS Contracts." (emphasis added.)

37. A broad definition of feasible is "possible to do easily or conveniently." It is the central purpose of the IOP to not unnecessarily and unwisely make premature decisions with regard to early releases from Shasta Reservoir that have the central effect of making certain Shasta Reservoir operations and Sacramento River temperature management options impossible or infeasible. All other options and operations remain feasible under the IOP because water, instead of being released, is held in storage. The decision to store more water longer (in March, April, and May, for example), of course will reduce the feasibility of delivering as much water to NOD contractors (compared to not maintaining higher storage, longer). The IOP process, unlike the BiOp, requires Reclamation to work with the Shasta Planning Group to maintain the feasibility of all options until a decision is made as to which path to proceed—better protecting winter run Chinook salmon and other species (and retaining more flexibility for later salinity control and other water deliveries), rather than delivering water, prematurely, to NOD contractors. The same is also true as it relates to managing overall operations to achieve EOS Shasta storages per the IOP—doing so improves the feasibility of successful temperature operations in 2023, though at the cost of reduced feasibility of achieving certain other water supply goals, for example.

38. Feasibility of a specific operation is an interesting question. In my opinion, it is physically feasible to maintain more water in storage in Shasta, and in almost all instances, doing so will increase the likelihood that better, more protective temperature control would be possible by doing so. It is also my opinion that doing so is also institutionally feasible. Whether or not the State Water Board or other parties involved decide it is appropriate to do so depends on the relative weight placed on protection of winter run Chinook salmon and water supply. I have not been asked to, and so will not, opine on this weighting. It is clear, however, that the IOP inarguably provides more opportunity to protect winter run Chinook salmon than does the 2019 BiOp.

WHEN TO PERFORM MODELING

39. It is a relatively simple matter to determine at any point in March, April, or May, once the volumes and temperature of water in Shasta are known with more certainty, what is possible with regard to downstream temperature control. If modeling performed shows that releasing specified volumes of specified temperature will have no effect on the ability to maintain specific habitat criteria temperatures in May through October that are determined to be sufficiently protective, then the water can be released. If, however, the models show that this early release would result in less cold water available to achieve those temperatures, then it may be determined that it is not prudent to do so. There are no absolutes. The IOP provides the structure to attain achievable habitat criteria and carryover storage goals.

40. Modeling done in March, April, and May could show, for example, that a specified, relatively small quantity of water can be released in May through September to achieve Sacramento River temperature habitat criteria for the longest possible duration. This flow pattern may very well, however, conflict with water supply goals to NOD contractors or other systemwide CVP and SWP constraints. This does not, however, obviate the need to identify this "best possible winter run Chinook salmon protection" constraint along with all other possible constraints, so that the best overall operational solution can be implemented with the concurrence of the Shasta Planning Group.

41. The BiOp and the IOP both allow flexibility in attaining their respective temperature requirements if conditions exist that make attainment of these temperatures problematic. As I explain in my November 23, 2021 declaration, this is as it should be, because specifying such temperatures as absolutes can create a problem of achievability that could result in harmful outcomes for winter run Chinook salmon. For example, operating to meet a rigid temperature requirement until it is no longer physically possible to do so, and then losing the ability to maintain any temperature control is, in general, a far worse outcome than metering out whatever cold water is available over a longer time period. But again, as for all elements of this physical and biological problem, it is best to have hydrologists, biologists, engineers, and other experts from the resources and regulatory agencies confer, in the moment, when data is available, as the

IOP requires, to determine what is possible without the confusion of hypotheticals and major uncertainties that exist as of the date of this Declaration.

42. The quantity of water delivered to NOD contractors has an enormous effect on the feasibility of maintaining temperature control in the Sacramento River during the temperature control season over a wide range of hydrologic conditions. Deliveries in the spring months of March, April, and May are particularly important for the reasons already stated-- so as to not preclude successful temperature management options through the temperature control season. Mr. Bergfeld makes several references to the Sacramento River Settlement (SRS) Contractors voluntarily delaying diversions. For example, in his summary conclusion numbered 5, on page 4 of Exhibit B, Mr. Bergfeld states: "In 2014 and 2015, the SRS Contractors diverted water in accordance with their contracts, voluntarily delayed diversions in the spring at the request of Reclamation, and transferred water, as approved by Reclamation".

43. The BiOp also acknowledges that it is useful to limit deliveries to NOD contactors. On page 6 of the BiOp, Reclamation states: "Collaboration among the parties in dry or critically dry years has been demonstrated in the past, such as when Reclamation requested, and the SRS Contractors voluntarily agreed, to reschedule diversions in 2014 and 2015."

44. The difference between the BiOp and the IOP, however, is that it may be necessary (or at least desirable from the perspective of being able to best achieve downstream temperature controls), to reschedule or reduce diversion to SRS Contractors even if the SRS Contractors **do not agree to do so**. The contractual and water rights implications of doing so are, however, beyond the scope of my analysis of this matter, and in my opinion, unnecessary to inform the potential beneficial effect of implementing the IOP. In my opinion, the IOP provides a far better process than the BiOp to protect winter run Chinook salmon.

45. In paragraph 11, Mr. Deas states: "In my opinion, neither the IOP nor the PCFFA proposed order are supported by sufficient analysis, and I have significant concerns as to whether Reclamation can feasibly meet their storage and temperature requirements with respect to Shasta Lake operations." Mr. Deas suggests that comprehensive modeling of all possible outcomes under a range of hypothetical future conditions must be performed to support the process and

goals enumerated in the IOP. This is flawed logic. The IOP requires no modeling now to demonstrate the superiority of the IOP over the BiOp in its potential to afford far greater protection to winter run Chinook salmon. The IOP prescribes both goals and **process** to achieve better outcomes than the BiOp.

46. Modeling to confirm, or not, that better outcomes are possible, need only be performed when sufficient data is available to do so. Mr. Deas' and Intervenors' mischaracterization of what the IOP does is an unfortunate error that continues to obfuscate both the intent of the IOP process and how and when intelligent modeling is best undertaken to understand this complex physical and biological system. One could, of course, with sufficient time and resources, perform comprehensive modeling that explores the potential outcomes of a wide range of possible future conditions as they relate to the management of Shasta Reservoir. But as both Mr. Deas and Mr. Bergfeld correctly state, Shasta temperature management combined with overall SWP and CVP operations management has many moving parts. The time to do modeling is when there is adequate information to model, in March, April, and May. A principal problem with operations under the BiOp is the incorrect presumption that one can wait to determine how this complex system can be successfully operated to achieve many goals until after some decisions are made that reduce the availability of options to achieve temperature management goals.

47. Though robust retrospective modeling analysis of 2015 or 2021 could be performed to identify what could have occurred instead of what did occur, if less water had been released from Shasta in March, April, and May of those years, it would be of limited value to inform 2022 operations and management. Bracketing the possible results, such modeling could show at the extremes: 1) no better temperature (or worse) temperature outcomes would have occurred; or 2) much better temperature outcomes would have occurred. The likely result would probably be somewhere in the middle, but in my opinion, tending towards the better outcome, all other things being equal.

48. The reason that a retrospective of 2014, 2015, or 2021 is of limited value is that all years are different, so it would be difficult or impossible to draw a specific conclusion of what

either 2015 or 2021 results would mean for 2022, with different underlying conditions. Such a retrospective, done for multiple years, would, in my opinion, demonstrate that, to different degrees, leaving more water in storage longer provides more ways to achieve temperature goals.

49. Such a retrospective could determine if temperature goals could have been better achieved if there had been lower deliveries to NOD contractors in March through May of those years. Based on my recollection of 2015, and on the abrupt change in Shasta and CVP and SWP operations that occurred after more and better Shasta temperature information was made available by Reclamation in late June, it appears that more successful temperature operation would have been possible if some of the early March through May deliveries to NOD contractors had not been made. But even if not the case, the important point is that the temperature situation each year is very different. What is important is that the volumes of water released in those years, if repeated in 2022, **could**, and likely would, have an enormous effect on whether temperature management goals can be achieved.

50. The IOP simply requires Reclamation to wait until it is better known if the volumes and temperatures of water in Shasta in March, April, and May (and the associated forecasts of those parameters into future months in March, April, and May) have the potential to make a difference. If modeling of the types that Mr. Deas and Mr. Bergfeld and I agree about, of the known and forecasted conditions, fails to show that water held back from release in March, April, and May could have any positive effect on successful temperature management, then, under the IOP, the water can be released in March, April, and May, with no additional[4] harm to winter run salmon. If, conversely, model analyses of the known and forecasted conditions do show that holding more water back in March, April, and May can improve conditions for winter run Chinook salmon through the temperature control season, then it may be necessary to not make the same level of releases to NOD contractors.

[4] Additional in the sense that only certain outcomes will be physically possible based on the current and forecasted physical conditions. The IOP cannot, of course, obviate the potential for any harm under extremely dry or warm conditions, but it can make conditions better and thus prevent additional harm above what will occur because of the poor hydrologic conditions.

51. In paragraph 20, Mr. Deas states: "Mr. Grober's conclusion that a fixed volume of cold water in the spring is available to be distributed over a period of 4-5 months does not consider access to the cold water to meet downstream temperature objectives or seasonal heating that reduces the cold water volume through the spring, summer, and fall. For example, Mr. Grober does not consider the inability of operators to utilize the Upper Gate levels in the TCD when storage is insufficient, thus hampering the ability to use cold water most efficiently by blending waters from different elevations in the reservoir."

52. My conclusion that a fixed volume of cold water in the spring is available to be distributed over a period of 4-5 months did not need to consider all possible permutations on the nature of the cold water or accessibility by the TCD. As I stated in paragraph 56 of my November 23, 2021, Declaration:

> **Each year, however, will have different temperature profiles and there will be different potential benefits associated with using stored water for temperature control**. In some instances, there could be a quantity of very warm water on or near the surface of Shasta Reservoir that can be used for water supply in March, April, and May without having any large effect on temperature control in the following months. The ability, or not, to effectively use any specified quantities of water for temperature control later in the year for any specific year does not inform what could be achieved using a similar quantity of water in another year. In general, however, more water held in storage, with the potential to have a larger cold-water pool for later use, is better than less water held in storage, with a smaller pool of cold water.
>
> Grober Decl., ¶ 56 (emphasis added).

53. Each year is different, and as Mr. Deas states, many factors must be considered to develop a successful temperature management plan, including how much cold water can be accessed, and for how long, using the TCD. This is, again, precisely what the IOP does. The IOP has a process under which experts work together with USBR starting in January, and continuing into March, April, and May to determine what is possible. IOP provision g.1.b accounts for a situation when certain operations may not be possible: "If Reclamation is unable to meet habitat criteria for the entire period the agencies will agree on an operation to provide sufficient habitat for the longest period possible." ECF 221, ¶ 12 g.l.b. All possible permutations need not be evaluated now to know that the IOP has better goals and a better process than the BiOp to protect

winter run Chinook salmon. The best possible management, based on the use of models, will be sorted out using the IOP process when Shasta Reservoir conditions are better known.

IMPORTANCE OF SHASTA STORAGE

54. On page 9 of exhibit B, Mr. Deas states: ”typically, lower river flows lead to higher surface-to-volume ratios and greater rates of change in temperature through time than higher river flows (**all other factors being constant**).” (emphasis added) Mr. Deas provides a good example of why, in general, more water stored in Shasta, even if the same overall temperature, and not just more cold water, is better. In some situations, an adequate volume of cold water is necessary to sustain the inevitable warming that occurs as it moves downstream. It is also the principal reason the IOP is far better than the BiOp in protecting winter run Chinook salmon because, all other factors being constant, more water in Shasta is better for subsequent temperature management.

55. Mr. Deas is also correct in the ordering of factors important for temperature management. In his Declaration in paragraph 13, and on page 11 of Exhibit B he states: “Elements of temperature management in a reservoir-river system to meet downstream temperature objectives include **total reservoir storage**, temperature of stored water, selective withdrawal capabilities at the upstream reservoir, tail bay temperatures (water temperature immediately below the dam that represent all releases from the dam), meteorological conditions, regulating reservoirs, tributary contributions, and heat gain in free-flowing river reaches.”(emphasis added) Total reservoir storage is correctly listed first because it is the driver of successful temperature management.

56. Mr. Deas also highlights the importance of high overall Shasta storage to successfully operate the Shasta TCD. On page 28 of his Exhibit B, his concluding statement, made in reference to the undesirable conditions when cold water cannot be accessed by the TCD to manage temperatures: “These conditions can occur in years when **initial storage is low** and access to the upper gates is limited, potentially diminishing the effectiveness of the TCD for late season temperature` management.” ECF 239 at p. 51 (emphasis added). Once again, Mr. Deas shows why initial storage conditions are a principal determinant of whether successful temperature management can be achieved.

SUMMARY CONCLUSIONS AND OPINIONS

57. Intervenors, Mr. Bergfeld, and Mr. Deas misconstrue the IOP as a specific operational plan and attempt to demonstrate that not enough information was considered or that elements of the IOP itself are infeasible. In my opinion, the foundational purpose of the IOP is not to prescribe any specific operations plan (though it does identify habitat criteria and goals that would be more protective to winter run Chinook salmon than does the BiOp). The principal purpose of the IOP is prescribing a **process** that Reclamation must follow so as not to foreclose otherwise feasible options to protect winter run Chinook salmon, and other species. In contrast, the BiOp reduces the overall feasibility of protecting winter run Chinook salmon and other species. The potential to delay, suspend, or reduce deliveries to NOD contractors in March, April, and May, under the IOP, does not make such water deliveries infeasible until any such specific decision is made by the Shasta Planning Group in March, April, and May. And, even then, such a decision would be made only if it can be demonstrated that such an operational decision is necessary to protect winter run Chinook salmon.

58. As Mr. Bergfeld states, "the combination of natural factors, regulatory requirements, and multiple purposes make the operations of the CVP complex", however, these factors are not so complex that the decision to make early, premature releases from Shasta Reservoir cannot be first considered by the Shasta Planning Group, per the IOP, to determine first if doing so would be harmful to winter run Chinook salmon. Operational constraints on Shasta Reservoir merely need be made before, and in conjunction, with determination of other operational decisions.

59. As Mr. Bergfeld states, "the complex and integrated operation of the CVP makes it challenging to determine that one particular action resulted in one specific outcome," however, "To make such a determination with the benefit of hindsight is to ignore the complexities and uncertainties of actual operations in real-time." Hindsight is not necessary to dictate any specific operation in 2022. Hindsight does, however, inform timing and processes that can be used to operate Shasta Reservoir in a manner that better protects winter run Chinook salmon. The IOP is that better process.

60. As Mr. Bergfeld states, "Reclamation operated the CVP and Shasta Lake during the 2014 and 2015 drought, and regulatory agencies such as the State Water Resources Control Board, the National Marine Fisheries Service, and other agencies dictated regulatory requirements for this period." USBR, however, did not share all data and modeling in a timely manner in 2015, thus delaying and pre-empting helpful responses to the critical conditions. The IOP assures a more timely and collaborative effort, that protects winter run Chinook salmon, will occur in 2022.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed this 24th day of January 2022, at Sea Ranch, California.

Les Grober

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